Summer, 1973

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Noranda Research Centre

Formed in 1961 to consolidate the growing research and development efforts of the international Noranda Group of Companies, the Noranda Research Centre was established in its present building at Pointe Claire, Quebec, in 1963. The pilot plant facilities were enlarged in 1971 and a further expansion to the main building is planned in 1973-74. The Research Centre will be celebrating its 10th anniversary on July 4, 1973.

The Centre's prime function is to support and advance through research and development the competitive position of the Noranda Group in world markets. In an interview, **Dr. W. H. Gauvin,** *Noranda's Director of Research and Development, explained how this responsibility is carried out by a staff of more than 100 professionals and technicians engaged, broadly, in the continuing study of the technology of metals and the development of new or improved processes and products. Average age of the Centre's staff is 36 and they represent various disciplines, including: chemical and metallurgical engineering, physics, electrochemistry, chemistry (inorganic, physical and polymer), economics and business administration.*

Contents

Molten copper is poured into a converter during tests at the Noranda Research Centre preceding the successful development of the Noranda continuous copper smelting process.

Technical Capability Must be Maintained

"I agree that criticism of Canadian industrial research and development efforts is justified. Industrial research and development in Canada has been steadily declining on a constant dollar basis over the past four years in spite of government incentives aimed at raising the level of industrial R & D.

"Reasons for the decline in Canadian industrial R & D include recent changes in taxation that have not given Canadian industrialists the kind of confidence required for major outlays in research and development. The fact that Canadian research and development efforts have not, on the whole, been too productive is probably another reason. We must also concede the heavy dependence by subsidiaries of foreign companies on the industrial research and development efforts of their parent companies."

–Excerpt from an interview with Dr. W. H. Gauvin

To understand how the Noranda Research Centre fulfils its basic function, it's necessary to consider the approaches we follow in working toward — and meeting — the prime objective.

Short and long-range planning is a prerequisite to all undertakings in a modern research and development organization.

The Centre's short-term planning — from three to five years — is directed toward solving problems that are clearly identifiable at this time. These include meeting new product needs of Noranda Group companies, developing improved or new processes that will make a greater contribution to environmental protection, and to anticipate expected increases in energy, labour and raw material costs.

Long-range planning is more difficult, of course, because it requires predictions involving a variety of factors and pressures which will influence the economy five to 10 years from now and the future direction of the Noranda Group. These developments or forces are, basically, of an economic nature, although social influences are becoming increasingly important.

Variables in long-range economic forecasting include, for example, taxation policies, the availability and interest rates of capital, future policies of labour unions, costs of energy and raw materials, and markets.

In the social sector, we expect that major pressures related to ecological and environmental considerations will continue. Other long-term social pressures are expected to arise from demands by company personnel for increased participation in management decisions that affect them directly and, of course, from calls for further improvements in working and safety conditions.

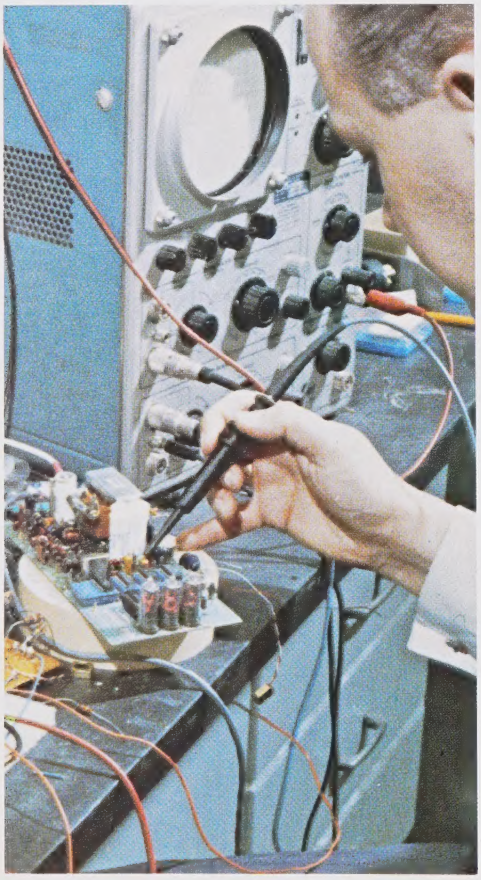
From our present analysis of the situation, we believe that resource and manufacturing operations will have to contend with increasing government involvement in industrial matters generally. Examples include control of gaseous emissions within levels now in the process of being established; controls on the quality of effluents and the disposal of wastes by recycling where feasible, or by storage under conditions that will not detrimentally affect the environment. It's hoped that these con-

trols will be established in close consultation with the industries affected.

Information Flow

The complexities of a modern research and development centre require a strong, central source of technical information which can be retrieved quickly. The Centre's technical library contains more than 5,000 volumes and is particularly strong in the fields of chemical and metallurgical engineering, inorganic chemistry and physics. In addition, there are about 200 reference books and a 10-year collection of prominent scientific journals. More than 250 periodicals are received regularly and these, together with special reports, documents and microfilms, are filed in the Centre's spacious library.

A computerized system — the Noranda Information Retrieval System (NIRS) — is extremely important to the Group's technical operations. This



The Centre's instrumentation laboratory designs and produces about 25 instruments each year for new processes and also for the improvement of existing processes at various Group operations.

service, which is being steadily expanded, facilitates storing of information and provides for its instant retrieval.

Because it's aware that large companies such as Noranda can make important contributions to cultural activities, the Centre has started a small collection of extremely valuable rare books and of first editions in the fields of mining, metallurgy and earth sciences. This collection is open to the public.

Among its diversified activities, the Centre also provides special analytical services for Noranda Group companies. Another basic service is providing a pool of scientifically and technically trained personnel on which the Group's companies may draw for advice on technical and innovative aspects of their operations. Regular visits are made by Centre personnel to operations where, in consultation with local management, they assist in identifying and proposing solutions to problems. Conversely, personnel from the Group's plants frequently discuss their problems with us here at the Centre.

Close Collaboration

The importance of close collaboration between the Centre and the various Noranda Group operations is self-evident. Frequently, during the development phase of a new process or product, technical work is conducted right in the operating plant — jointly by staff from the Centre and the plant. Two excellent examples are the development of the new Noranda continuous smelting process at the Noranda smelter and the continuous strip casting process for copper and copper alloys at the Fergus plant of Noranda Metal Industries.

In some instances, the basic development originates in one of the Noranda Group companies. An example is Forge-Fin tubing which was developed by the French Tube Division of Noranda Metal Industries. The role of the Centre in this case was to develop basic design data for the tubing to test new heat transfer applications and to provide technical assistance in the marketing of Forge-Fin tubing.

Somewhat different in scope and purpose, but still illustrative of the collaboration we're striving to promote, was a two-day seminar on "Computer Control of Concentrators" which was organized by the Centre on May 24-25 of this year. This seminar was attended by most of the mill superintendents and metallurgists in the Noranda Group, together with well-known experts in the field.

Clearly, the emphasis is on marshalling all of the Group's technical capabilities at the Centre and at properties and manufacturing operations where there are technically excellent people.

A basic Centre objective is to remain in the forefront of technology that's of particular interest to the Noranda Group. By projecting an effective technical image to the outside world, considerable support is given to Noranda Sales Corporation and to our North American and other operating companies when they are penetrating new markets, particularly markets of a high technological nature. Acknowledgement of the Centre's scientific capability also helps its relations with government departments and agencies involved in technical and scientific developments.

Leader in Copper Technology

Our concern for technical capability, supported by the experience available in the operating companies, has — I believe — placed the Centre in the forefront of copper technology. This leadership was demonstrated, for example, by the successful development of the Noranda process for the continuous smelting and converting of copper concentrates.

Other pyrometallurgical developments are processes for the gaseous deoxidation of copper and the recovery of copper from slag. In copper electro-refining, extensive research has been done on levelling agents, cell monitoring, and the treatment of anode slimes for Canadian Copper Refiners. Work on the leaching of oxide copper ores has led to a vat-leaching process for Gaspe Copper Mines. Currently, work is proceeding on a novel process for the hyrometallurgical treatment of copper concentrate. Such a process would offer an alternative to smelting.

The Centre's work on metallurgical processes extends beyond copper. A leaching process for upgrading molybdenum concentrates was developed for Brenda Mines; production of ammonium molybdate from molybdic oxide — a process developed at the Centre — has commenced in Europe. For the first time, the Centre is studying lead process technology — a project related to the Smelting Division of Brunswick Mining and Smelting.

Mineral processing is a comparatively new activity. Current investigations are aimed at improving recoveries in flotation and obtaining higher grade concentrates. Here again, tests conducted in the mills are an important factor. Computer control of milling operations is receiving increased attention and is one of the major activities of a new process control group at the Centre.

Noranda Research Centre marks the 10th anniversary — in July, 1973 — of its establishment at Pointe Claire, Quebec.

Meeting Social Pressures

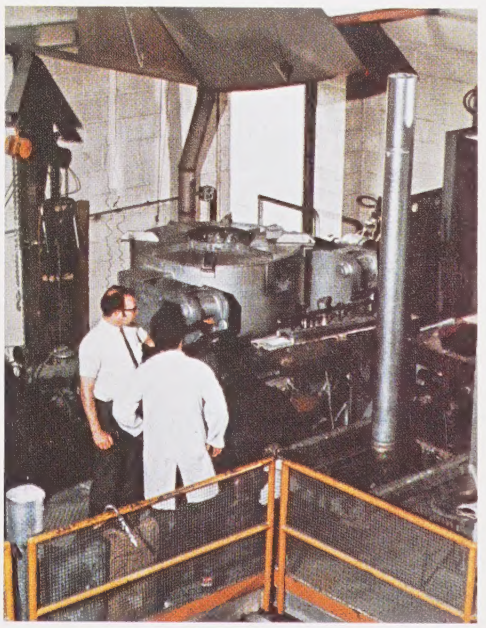
We have mentioned that certain social considerations — ecological concerns and employee working conditions, for example — have assumed increased importance. This has been reflected for several years in the Centre's activities. In 1972, an ecological laboratory was installed to advance the Centre's ongoing environmental control research, which commenced shortly after the Centre's establishment at Pointe Claire in 1963.

The concept of the Noranda continuous smelting process, for instance, encompassed two fundamental objectives: environmental control and operating efficiencies. It was designed specifically to produce a gas strong enough in SO_2 to permit its recovery in the form of either sulphuric acid or elemental sulphur.

Reduction of the SO_2 content of metallurgical gases by converting the sulphur dioxide into elemental sulphur is one of the Centre's most promising projects. Elemental sulphur can be stored pending development of new uses for this product — now in oversupply. This, of course, means an added cost to the process until economic outlets for the sulphur can be established. Based on the extent and quality of research underway into new sulphur applications in building and road construction, I'm confident broader uses will eventually be found. The Centre is collaborating with McGill University and with the University of Sherbrooke in sulphur-use research and also in the conversion of slags and/or tailings into useful construction materials.

Equal attention is directed toward control of effluent quality. A current Centre program, for example, is aimed at developing a process for stripping ammonia from plant effluent.

In the forest products sector, in which the Noranda Group has substantial interests, the Centre is studying effective utilization of sawmill waste and methods of upgrading lumber through the development of composite fibre boards and a multi-functional lumber treatment application process (anti-stain, fire-retardant, moisture resistant).



Casting of a new zinc-aluminum alloy developed at the Centre.

More Emphasis on New Products

Because of intensified international competition, the Centre's policy in recent years has been to place more emphasis on patented new products that answer definite market needs. Practical application of this policy enhances the potential for increased metal sales, or upgrades the quality of metal for subsequent conversion into a useful product, thus improving its added value.

It is encouraging to note the number of new patented products and manufacturing processes that the Centre will have ready for commercialization this year, or following completion of limited additional — usually demonstration — work. (See accompanying list)

One of the major developments for commercial application in 1973 is a process for electrodepositing copper directly on aluminum. This has important implications not only for wire and cable, but also in plating aluminum die castings and, generally, in protecting all aluminum shapes which should be coated either by a copper or chromium deposit. It's conceivable this process will be used in the Canadian and U.S. operations of such companies as Noranda Metal Industries, Canada Wire and Cable and Norandex Inc. The process will also be available for licensing to other manufacturers.

Undergoing pilot-scale trials prior to eventual commercialization this year is a process for the electrodeposition of molybdenum-chromium alloys on metals. The method bypasses the use of nickel in conventional plating operations and produces an extremely tough and corrosion-resistant surface on a product that will find application in the automotive industry, among others.

A newly-developed zinc screw machining alloy, under the trademark Z-500, is undergoing an active promotional program. Intensive work is also proceeding on development of superplastic zinc alloys through a process which, again, bypasses many of the operations now used in the production of complex metal parts. The starting material, generally in sheet form, is brought into contact with a low-cost die at such a temperature (about 250 degrees centigrade) and at strain rates that the alloys behave like plastics. The new alloys, via superplastic thermoforming, will challenge plastics and other metals for parts found in virtually every aspect of daily life: automotive parts, household appliances, etc.

Another activity at the Centre in 1973 is the development of molybdenum-containing steel forgings through powder metallurgy. This program — directed at increasing molybdenum sales — will offer a significant economical alternative to forgings from conventional bar stock for the automotive industry.

Environmental considerations will undoubtedly continue to be among the major social pressures that must be taken into account in long range research and development planning. The proportion of the Centre's ($2.2-million) annual operating budget devoted to research in this area will be about 15 per cent in 1973 and will cover multiple aspects of the Noranda Group's operations.

'High Technology' Research

One of the Centre's most intriguing programs deals with advanced technological developments in electronics, including semi-conductors, electronic devices and surface chemistry of these products. This program, which will account for some $400,000 of the Centre's 1973 operating budget of $2.2-million — an increase of about 25 per cent over 1972 — is sponsored and financed by Canada Wire and Cable.

"While we are encouraged by the support we are receiving from major companies in the Noranda Group, I feel that smaller companies do not use the Centre's services as much, perhaps, as they should."

We're also looking at new metallurgical processes based on the use of plasmaflames and plasmaflame devices which, as a result of the extremely high temperatures they can generate, effect reaction at much higher rates and in less complex equipment than conventional low-temperature methods. This is an extremely challenging area — typical of new fields in which we're constantly involved. I have been conducting work in this sector at McGill University with graduate students for the past 11 years.

Centre Funding

Funding of the Centre's projects, which are subject to approval by the Noranda Research Committee to which I report, is provided by Noranda companies. I think we're unique in the insistence placed by this committee on close scrutiny of all projects and also in the acceptance and support of projects by our operating companies. This forces us to do a lot of necessary soul-searching in selecting and justifying programs.

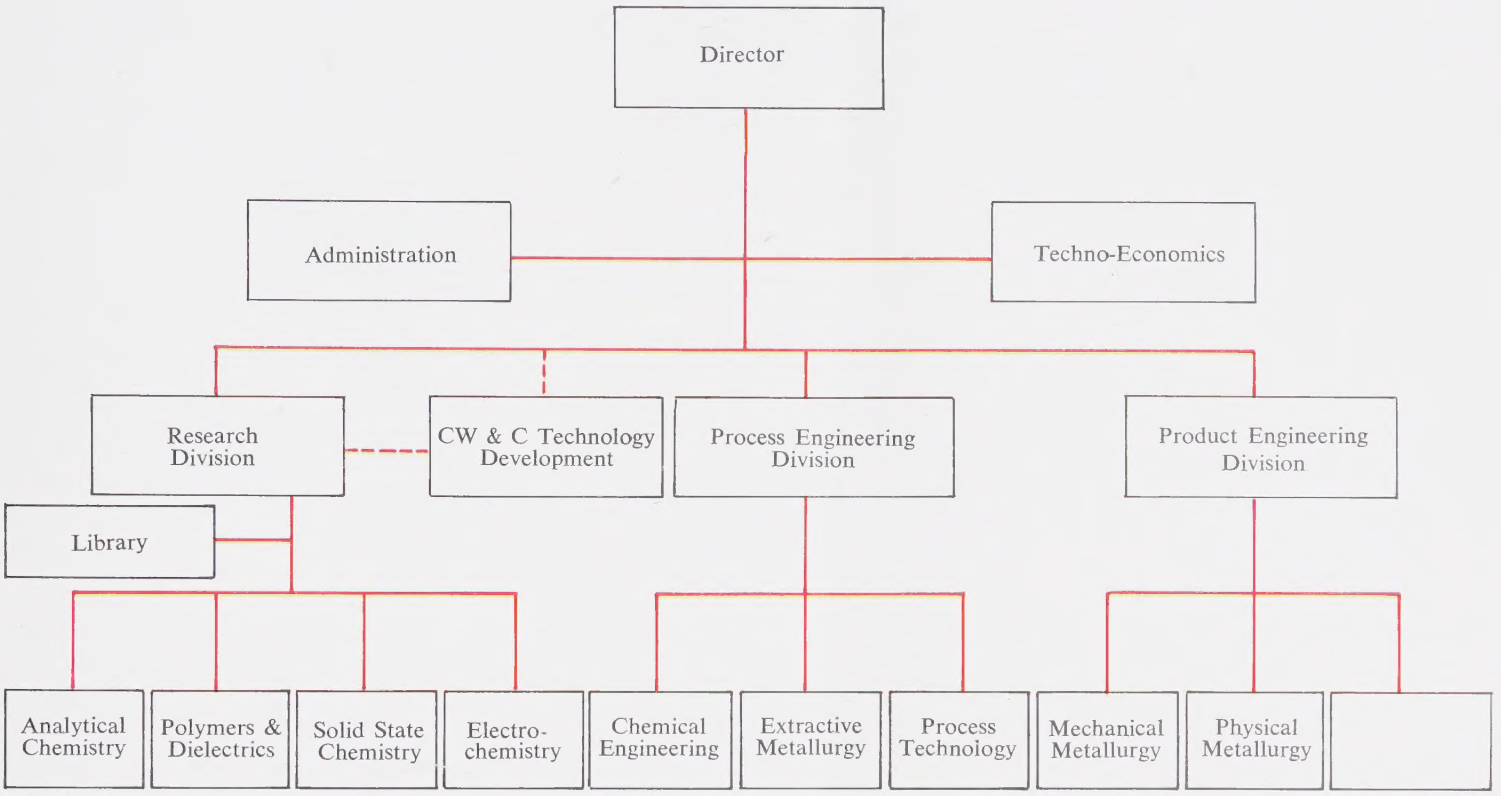
Project categories are in three main areas: projects sponsored and financed by a Noranda company such as Canada Wire and Cable; programs — usually of a broad and long-range nature — sponsored by the parent Noranda Mines; and, finally, projects that investigate new research ideas. This last category is under my control and reflects the freedom the Centre has to investigate possibilities at very early stages of conception. From this category have come some of our most successful ideas in the past.

All of the Centre's programs conform to an operating philosophy which, I believe, is unique in the Canadian context. We regard the Centre as a unit within a profit centre that includes research and development, market development and sales. We believe that research and development should not be considered as an expense or an investment, as is usually the case. Funds are channelled into research and development and, through new or improved processes and products, are converted into either operating or licensing profits.

Market-Oriented

The Centre's Techno-Economics Department conducts analyses of all programs to assess their profitability if they are eventually successful. In other words, the emphasis is on tackling projects which, in an identifiable way, can be profitable for the group, taking into account social implications. This combination of economic and social evaluations, together with the establishment of close co-operation with operating companies and the definition of research and development as a unit within one profit centre, is rare in Canada.

The Noranda Research Centre



New Products and Processes for Commercial Development in 1973

• Noranda process for the continuous smelting and converting of copper concentrates (commercial-scale prototype reactor for the treatment of 800 tons of concentrates daily became operational in the first half of 1973 at Noranda, Quebec).

• Continuous casting of copper and copper alloy strips.

• Z-500, a new zinc screw-machining alloy.

• Rod casting technology for zinc-aluminum alloys and possibly other metals and alloys.

• Electrocoating of Insulators on Foils.

• Electrochemical deposition of copper on aluminum.

• Protection of galvanized steel against wet-storage staining.

• High pressure drawing of rod and wire.

• Instruments, such as microwave moisture gauge, for varied applications.

• Treatment of copper refinery slimes (in collaboration with Canadian Copper Refiners Ltd.)

• Electrodeposition of molybdenum alloys.

• Abrasion-resistant cast iron.

• Upgrading of molybdenite concentrates (already commercial at Brenda Mines).

• Gaseous deoxidation of copper (already commercial).

Canada's Industrial R and D Lags Behind Other Nations

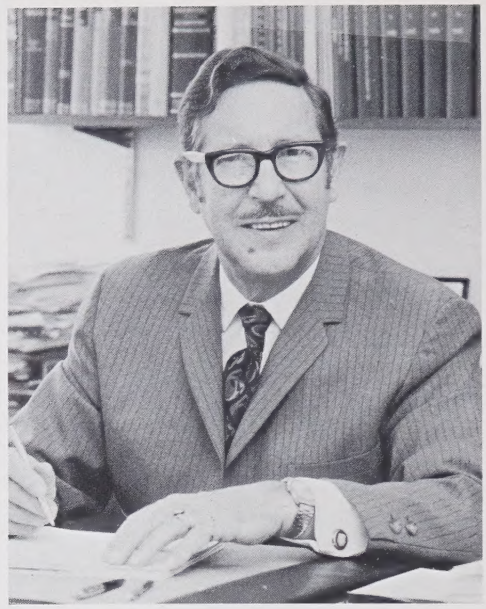
Expenditures on industrial research and development in Canada account for 1.4 per cent of the Gross National Product, placing the country in eighth position among leading industrialized Western nations for industrial research and development expenditures as a percentage of Gross National Product. Canada trails the United States, the United Kingdom, Holland, France, West Germany, Sweden and Japan.

(in $ millions)

Year	Operating		Capital		Total	
	Actual $	Constant 1968 $	Actual $	Constant 1968 $	Actual $	Constant 1968 $
1968	305.1	305.1	35.8	35.8	340.9	340.9
1969	342.9	323.1	49.3	46.2	392.2	369.3
1970	347.9	309.2	53.2	47.1	401.1	356.3
1971	337.0	283.0	54.0	45.3	391.0	328.3
1972 (est)	349.0	275.1	62.0	49.0	411.0	324.1

*An inflation factor of 6 per cent annually has been assumed in calculating constant 1968 dollars.

The Noranda Research Centre has achieved an international reputation for the calibre of its researchers and for the process and product innovations they have developed. Many past and present members of the Centre's staff are prominent in the North American scientific and engineering community. The Centre's progressive policy on publication of scientific papers has resulted in wide professional recognition of the Centre for its contributions in the fields of science and engineering. Staff members have been recipients of many awards over the years.



Dr. W. H. Gauvin

Dr. W.H. Gauvin

RESEARCH DIRECTOR COMBINES INDUSTRY-ACADEMIC CAREERS

Dr. William Henry Gauvin, Director of Research and Development for Noranda Mines Limited since May, 1970, was appointed research manager in 1961.

Born in Paris, France, in 1913, he received his early education in Paris, Brussels and London, England. He arrived in Canada in 1930 — "right at the start of the depression . . . all I had at the time was a B.A. degree from Paris, but I quickly learned how to survive."

After working at a number of odd jobs during the 1930s, he enrolled as an undergraduate in chemical engineering at McGill University in 1938. Four years later, he received a master's degree in chemical engineering and, in 1945, a doctorate in physical chemistry from McGill.

He has successfully and energetically combined careers in both the academic and industrial sectors. His association with McGill, from the time of his enrollment as a student, has extended over 34 years. Between 1942 and 1944, he was a lecturer in McGill's department of chemical engineering and an associate professor in that department between 1947 and 1962. From 1961 to date, he has been in charge of doctoral research theses. Last year, he was appointed Senior Research Associate — "without pay" — in McGill's department of chemical engineering.

Before joining Noranda in 1961, his industry experience included two years as a Montreal-based plant superintendent (1944-45); consultant to, and subsequently head of, the chemical engineering division of the Pulp and Paper Institute of Canada (1951 to 1961).

The recipient of numerous awards for his contributions to engineering science, Dr. Gauvin has published more than 120 papers in the fields of electrochemistry, high-temperature heat and mass transfer, fluid mechanics and particle dynamics. His work has resulted in 16 patents in high-temperature chemical processing. The University of Waterloo honoured him with an honourary doctorate of engineering in 1967.

A member of McGill University's Board of Governors, he is also a member of Conseil de la Politique Scientifique du Quebec, the Science Council of Canada, the Research and Planning Council of the American Management Association and the Canadian Council of the Weizmann Institute of Science. He is a former council member of the National Research Council (he has also served NRC in an executive capacity "on loan" from the Noranda Research Centre during 1970 and 1971). He was president of the Canadian Society for Chemical Engineering between 1966 and 1967.

Dr. Gauvin, who lists his recreational activities as tennis, fencing, sailing, chess and the piano, lives with his family in Beaconsfield, Quebec.

GRADUATE RESEARCH FELLOWSHIPS

In 1970, Noranda Mines Limited established a number of Graduate Research Fellowships to stimulate pure and applied research in mining and metallurgy in Canada. Tenable at Canadian universities, the fellowships are valued at $5,500 each, including $1,000 for equipment and other expenses. Awarded on an annual basis, the fellowships may be renewed for a period of three years.

Fellowships are granted for post-graduate research in the following fields related to mining and metallurgy: mining, mineral engineering, extractive metallurgy, chemical engineering, inorganic chemistry, physical metallurgy and materials science. Application through the appropriate university department should be directed — not later than April 1 — to the Director of Research and Development, Noranda Research Centre, 240 Hymus Boulevard, Pointe Claire, Quebec. Recipients will be notified by May 1.

Fellowships are awarded on the recommendation of an Awards Committee, which includes representation from Canadian universities.

TV Actors Display Mettle Filming Noranda Ads

By Len Marquis

Since early May, Canadians have had the opportunity of viewing television commercials on Noranda's origin, its integration, how its diversified operations touch people's lives, its commitment to environmental protection. The commercials, which marked Noranda's entry into network TV, are the product of some creative ad agency people and talented film-makers. Behind each 90-second production (as Damon Runyon's race-track "tout" used to say about his selection) "a story goes with it."

The detail required to recreate Ed Horne's famous find on the banks of Lake Osisko ranged from absolute minutiae to inane trivia. What, for example, did Ed Horne write on his claim posts in 1920? How were the posts laid out? What writing instrument did he use? To find the answers, film director Bill Irish went over details in early Noranda files with Paul Aronson of Noranda Exploration.

A Peterborough canoe firm came up with a 50-year-old craft typical of the Horne era. It was lovingly varnished, refurbished, and promptly sank when first tested in a Toronto high school swimming pool!

There were times when the search for a look-alike Ed Horne seemed to rival that which finally produced Gone with the Wind's Vivien Leigh. Almost 100 actors were interviewed to precise qualifications:

The face had to be tanned with crow's foot wrinkles around the eyes, the hands calloused and work-worn for closeups. Each candidate was asked in turn: "Are you willing to have your hair cut to a 1920 Kirkland Lake style?" (One long-haired actor sheepishly removed a wig, revealing a Yul Brynner dome.) "Can you press 150 pounds (for canoe portage sequences)?" Do you swim well? Paddle 'coureur de bois' or Indian style? Use the J-stroke?"

Yet once on location the successful 'Ed Horne' almost disappeared in the rapids of Georgia's Chatuga River on the first filmed take. He was saved only by a nylon rope and two brawny men (in hip-waders) the director had cautiously posted at the head of the rapids. No wonder this stretch of the Chatahatchee National Forest was chosen by the Hollywood makers of "Deliverance" for their most dramatic canoeing sequences.

The "look-alike" Ed Horne almost disappeared in the rapids of Georgia's Chatuga River during filming of canoeing sequence.

Chatahatchee National Forest? Chatuga River? Georgia?

That's right. Where else would one find a summery northern Quebec scene in the chilly month of February?

On the other hand, where the film-makers needed snow scenes, they got their fill. To film open-pit sequences at Gaspe Copper Mines, the crew donned snowmobile suits against the biting 35 degree below weather. The strapping young actor hired for the mining and skiing sequences came down with frost-bite. And when the film-makers took over the tiny Gaspesian town of Cloridorme for the opening scene of one commercial, it was only the warm generosity of the villagers that made the frigid days bearable.

The world of commercial film-making is one of orderly chaos and hard work. It is also quite remote from the 'glamour' most people imagine it to be. In this case, it meant 21 days of concentrated travel and on-location work, detailed arrangements and clearances with our operating personnel, U.S. national park authorities and Gaspesian home-owners. It meant lugging a 300-pound gasoline generator, giant carbon arc-lamps (brutes), camera equipment and supplies to locations that took as many as two days to find. And it all had to be done within the strict parameters of TV regulations that say none but actors' union members may appear on camera. This is why Noranda's president (who appears in one commercial) today is a card-holding member of both the Association of Canadian Television and Radio Actors and the Union des artistes.

From the first day of shooting to the final 'wrap' there were (thankfully) many moments of warm good humour and camaraderie. For example, the production manager's rakish black hat had long been a source of amusement to the rest of the film crew. As the final scene was being shot on a hillside (showing a technician with a helium-filled meteorological balloon), a production assistant grabbed the hat on signal and, while his mates held the struggling production manager, tied it to the weather balloon. It was last seen disappearing into the cloud cover at 25,000 feet and scudding rapidly in the direction of North Africa.

"The balloon just went up" may very well replace "it's a wrap" in the lexicon of film-making.

**Mr. Marquis is Director of Public Relations, Noranda Mines Limited.*

The Manitoba Mining Study

PREMISES. SELECTIVE STATISTICS DISTORT INDUSTRY'S PROFITS, RISKS

"A new resource policy, then, is not an attack on profits which are a legitimate return to people who have invested their money in commercial ventures rather than in banks or government bonds . . . But we are attacking what I call for the moment, super-profits or super-returns."

— From the **Report on Natural Resources Policy in Manitoba** by **Professor Eric Kierans,** McGill University.

"Less than one per cent of the mining companies . . . now incorporated in Canada pay dividends. For those Canadian mines that are profitable, the average return on investment varies between two per cent for gold mines and 9-10 per cent for non-metallic mines; the average profitability of the metallic mines lies somewhere between these levels."

— From a recent study prepared by the **World Bank**

The major thesis of Mr. Kierans' report is that mining companies earn "super profits" or "super-returns," of which an inadequate proportion reverts to Manitobans — the "landlords" of the province's resources. "Super profits" are classified in the study as any excess over an annual return, before taxes, of 15 per cent on invested capital which is defined as shareholders' equity plus long-term debt.

Major remedies proposed by the report, which suggests its policies should apply to all jurisdictions in Canada, include:

- The responsibility for all future exploration and mine development in the province should be undertaken by Crown corporations.
- All existing mining and concentrating operations should be repatriated to the Crown within a 10-year period.

Supplementary proposals include:

Imposition of taxes on ore reserves; replacement of the current 15 per cent mining royalty tax on net income by a similar tax on the value of annual production; an increase in mineral acreage tax and imposition of a tax on existing exploration leases.

Basic aim of these supplementary measures would be to speed the return of "excess reserves" and all mineral rights to the province.

Of the two major remedies proposed in the report, the first — involving future exploration by the province — "might require" an annual exploration budget of $4-million to $5-million, which would be financed initially by taxes on existing operators and later by a percentage of the profits of the mining Crown corporations. For the future development by the province of any new orebodies, the report recommends separate Crown corporations "so that competition in performance could develop between (Crown) companies and be judged by government and the public."

The second major proposal amounts to confiscation without compensation of existing mining and concentrating operations. Smelting and refining operations, which Mr. Kierans does not consider to be particularly profitable, would remain within the private sector.

To anyone familiar with mining, the report's description of the mining industry as one which earns "super-profits" or "super-returns" is completely unreal. Much of the report is simple assertion; even where it is based on analysis, it is naive and simplistic and is guilty of a selective use of statistics.

It is noteworthy that, in his list of acknowledgements of assistance given by others in the preparation of the report, Mr. Kierans refers to only one person — a former deputy mines' minister — who could be considered to have any real knowledge of the mining industry. Apparently, no attempt was made to consult with people from within the industry itself.

The report uses Statistics Canada data (reproduced below in a table taken from the report) to demonstrate that, in 1969, 177 metal mining companies earned 34.4 per cent on "operating assets." To arrive at the latter total, the report deducted all investments and depletable assets. Moreover, it questioned the costs deducted in arriving at profits and implied that a real rate of return would be closer to 50 per cent.

The report's conclusions from these data are highly suspect for a number of reasons:

1) Mining is very much a cyclical business; 1969 — the year referred to in the table — was an unusually good year for the industry. To draw conclusions about the industry's rate of return solely on the basis of 1969 data is completely misleading.

2) Statistics Canada data on the mining industry are highly fragmented; various companies are slotted under a number of categories. Data presented by Mr. Kierans relate only to a segment of the industry.

3) Asset figures shown in the table refer to historical costs. Some of the operations included have been in production for more than 40 years. Thus, replacement costs of these assets would be many times their book value. It is fallacious, therefore, to draw conclusions on return of new investment from the above data.

4) The table excludes from assets the capital costs of exploration for, and development of, the orebodies in question and has added back to profits the amortization of these costs. To argue that the cost of acquiring, exploring and developing an orebody should not be included when calculating a rate of return is incredible. (Adding these components back reduces the rate of return from 34.4 per cent to 21.3 per cent in what

Financial Statistics, 177 Metal Mining Only Corporations, 1969*

(Millions of Dollars)

	Assets	Total Income	Cost of Sales	Other Expenses	Profits
Mining	1,423.7	761.0	293.8	219.6	247.6
Mining, Operating Assets	960.9	718.4	293.8	219.6	205.0
Mining, Operating Assets less depletable assets	671.8	718.4	267.8	219.6	231.0

**From the Report on Natural Resources Policy in Manitoba by Professor Eric Kierans.*

A World Bank study concluded that the average return on investment from profitable Canadian mines varies between two per cent and 10 per cent for non-metallic mines and somewhere within that range for profitable metallic mines.

was an exceptionally good year for mining.)

5) The report also excludes from assets mining company investments (mainly in mortgages and in subsidiaries and affiliates) and eliminated income on these investments from earnings. The fact is that these investments are almost entirely in the mining industry or in other activities necessary to the industry's operations. (If these items are added back, the rate of return is reduced further from 34.4 per cent to 17.4 per cent in 1969.)

Profitability in Perspective

As for the average level of profitability in the Canadian mining industry, the following extract (our italics) from a recent study by the **World Bank** is relevant:

"It is commonly believed that the mining industry is one of high profits. However, the data offered to support this claim frequently take account of the larger, more successful projects and companies only, and are not representative of the industry as a whole.

"If all exploration expenditures are included, the industry can probably be said to be one of *average* to *above average* profitability, but also one in which numerous entities too small to spread their risks have failed.

"Less than one per cent of the mining companies . . . now incorporated in Canada pay dividends. For those Canadian mines that are profitable, the average return on investment varies between *two per cent* and *nine to ten per cent* for non-metallic mines; the average profitability of the metallic mines lies somewhere between these levels.

"On the other hand, a review of annual reports and the statistics provided by Fortune Magazine's top 1,000 U.S. companies and top 200 non-U.S. companies indicates that the profitability of the large mining companies, while significantly above the total industry average, is below that of some individual industries. The mining corporations included in the Fortune Magazine listings showed an average net profit in 1970 on shareholders' equity of 10 to 11 per cent for the U.S. corporations and 13 to 14 per cent for non-mining companies. However, the returns showed a wide range, from minus seven per cent to (plus) 37 per cent; so do earnings from year to year.

"There is no doubt that very high-profit projects (i.e., those with capital payback periods of four, three or two years and even less) do exist. These help to attract the large amounts of exploration capital required. It must also be appreciated that the successful projects must cover those unable to repay their capital, so that the industry as a whole can be viable.

"In areas experiencing some political uncertainties, mining corporations tend to consider only projects of high profitability. A study conducted for the U.S. Bureau of Mines shows that, while the average annual earnings on U.S. foreign investment in mining fluctuated between 10 and 15 per cent over the period 1954-67, this investment returned *less than 10 per cent* in Canada and up to 25 per cent in Latin America. Furthermore, income returned to the parent companies, although averaging only 60 per cent of earnings from the Canadian investments, was close to 100 per cent of the earnings of Latin American investment."

The findings in the World Bank study are a cogent commentary on allegations of "super-profits" earned by the mining industry.

A further reference to profitability is appropriate. Again on the basis of Statistics Canada (1969) data, the Manitoba report attributes a 59 per cent rate of return on sales to the Canadian mining industry; a 36 per cent return to integrated companies; and a 19 per cent return to smelting and refining companies only.

Among other problems arising from the use of such data from Statistics Canada, it should be recognized that all of International Nickel's operations (including mining) are included in the "smelting and refining only" category. This, of course, includes a substantial portion of the Manitoba mining industry.

In support of his major thesis that mining companies earn excessive returns, Mr. Kierans produced a table — based on Statistics Canada data — showing a reconciliation of book profit

". . . any serious study will reveal that 'super-profits' for the mining industry are the exception, not the rule, and yet the myth persists. The policies recommended by Professor Kierans would lead to a misallocation of the taxpayers' money, and to the immediate stagnation and ultimate decline of the mining industry. In fact, the mere existence of these recommendations creates uncertainty which, if not soon dispelled, will lead to the same result. And it is doubtful whether anything of comparable value — in terms of tax revenues, employment, export earnings, etc. — can be created to take its place."

— Alfred Powis, President of Noranda Mines Limited, in his address to the 1973 annual shareholders' meeting.

with taxable income for the years 1965-70. The reconciliation purports to show:

• Mining industry profits before taxes totalled $3,165-million for the 1965-70 period.

• Of pre-tax earnings, only $591-million was subject to corporation tax and $2,574-million escaped income tax.

Super-Profits Under Scrutiny

The "discrepancy" between the taxable and non-taxable figures is worth examining:

1) Of the total "discrepancy," $599-million represented non-taxable dividends received by the mining industry, with the major portion from other companies in the industry. As these are dividends usually received from subsidiary or associated companies, which have already paid taxes appropriate to their circumstances, inclusion of this amount by Statistics Canada in its data is really a form of double-counting when industry earnings are aggregated.

2) A further $969-million is explained by the federal three-year tax exempt period — a genuine tax concession — for new mines. The point for the future is that this concession, which has been the subject of considerable debate, has been eliminated under federal tax reform legislation.

3) Another $927-million is accounted for by depreciation and by other write-offs deducted for tax purposes in excess of book rates. While the ability to take such write-offs is the subject of continuous attack in the report, the following facts should be noted:

(a) This "discrepancy" arises out of an unusually high level of capital investment by the industry during the years in question;

(b) The provisions are not unique to the mining industry, but are available to all industry; and

(c) The provisions do not involve an avoidance of taxes — merely their deferral to a future year.

In addition, the analysis ignored provincial mining royalties which probably exceeded $350-million during the period under review.

In its assessment of the Manitoba mining industry, the report seems to be guilty of distorting the real profitability of the three major mining companies in that province. Statistics on these companies are alleged to relate to their Manitoba operations only, yet "book profit" figures were said to have been extracted from the annual reports of the companies, which do not segregate their results on a provincial basis.

Mining royalties collected could be interpreted as a conservative indicator of actual book profits (shown in the report at $86-million in 1970). The 1970 Manitoba mineral royalty rate on profits ranged from six to 11 per cent of profits from mining operations, while the average rate was probably in the order of 8-10 per cent. Thus, the $4.2-million collected in royalties in 1970 suggests that actual book profits were $42-52-million and not $86-million as indicated by Mr. Kierans. (For the purpose of provincial royalties, profits are calculated after deducting operating costs, provincial exploration, depreciation, but before interest on borrowed capital.)

There are other serious flaws in the report's examination of the Manitoba mining industry. Federal taxes are ignored in one statistical table, although they are subsequently referred to in passing. On the basis that the $2.7-million in provincial income taxes was at a 13 per cent rate in 1970, then the 40 per cent federal taxes must have been $8.3-million. Presumably this amount was also collected for the benefit of Manitobans.

On the basis of restated — and more realistic — statistics, it would appear that taxes paid by the Manitoba industry were closer to 30 per cent of book profits than the eight per cent calculated by Mr. Kierans.

In his address to the 1973 annual meeting of shareholders of Sherritt Gordon Mines Limited — one of Manitoba's "big three" metal producers — David D. Thomas, President, demolished the myth of "super profits" or "super returns" as defined by the Manitoba report and related to mining companies.

The Forgotten Years

Mr. Thomas calculated Sheritt's average annual return on invested capital over two separate periods: the 23 years between 1929 and 1951 when the company had just the Sherridon mine and concentrator, and a 21-year span from between 1929 and 1951 when the company operated its own nickel refinery.

In the 1929-1951 period, the company's average annual return on invested capital in its Sherridon mine and concentrator was only 8.4 per cent. "In only two years out of the 23 years in the 'Sherridon era' were Sherritt's profits over Professor Kierans' 15 per cent on invested capital."

Over the 1952-1972 period, which Mr. Thomas described as the Lynn Lake era, the company's average annual return on capital investment in mining, concentrating and refining was only 7.7 per cent. "Clearly, Sherritt has had no 'super profits' over its 46-year life," he said. Mr. Thomas had stressed that he knew of no precise way to divide an integrated profit between mining and refining.

Again, in only two years out of Sherritt's 21-year "Lynn Lake era" were mining and refining returns in excess of the Kierans' 15 per cent (super profit) rate of return. In 1969, the return was 25.5 per cent and, in 1970, it was 36.8 per cent. Both were years in which world prices of copper and nickel were unusually high and — coincidentally — 1969 and 1970 happened to be two of the three years used by the Manitoba study to emphasize "the great profitability" of the provincial industry. The other year used — 1968 — saw Sherritt record a return of 11.4 per cent. The study apparently chose to ignore the cyclical aspect of mine industry profits — indicated in Sherritt's case by the 7.7 per cent annual average return on invested capital over the 1952-72 period and the average of 8.4 per cent annually for mining and concentrating only over the 1929-51 period.

Many Factors Overlooked

The report's analysis of the provincial industry overlooked many factors. Among them:

• The increase to 15 per cent in Manitoba's royalty rate since 1970 and the pending elimination (December 31 next)

Mining Industry's Super Profits?

Based on the Manitoba study's formula for calculating average rates of return on invested capital, six major Canadian mining companies — Cominco, Falconbridge, Hudson Bay Mining, Inco, Noranda and Sherritt Gordon — had a weighted average return of 16.4 per cent in 1969, an exceptionally good year for the industry. The average return for these companies ranged from a low of 10.9 per cent to a high of 26.9 per cent.

In 1972 — a less inspiring year for mining — the weighted average return for the six companies was 8.7 per cent. Individual averages ranged from a low 2.2 per cent to a high of 11.8 per cent.

Applying the same formula to a representative group of companies from other industries — Dominion Bridge, Ford of Canada, Labatt's, Massey-Ferguson, Moore Corporation, Simpson-Sears and The Toronto Star — the 1972 weighted average return on capital invested was 19.1 per cent, or more than double the 8.7 per cent weighted average return in the same year for the mining group. The 1972 range for the non-mining group was from a low of eight per cent to a high of 33.2 per cent. In 1972, the low three companies in the non-mining category averaged the same as the top three in mining.

— Condensed from the address by David D. Thomas, President of Sherritt Gordon Mines, to the 1973 annual shareholders' meeting.

of the federal 3-year tax exempt period for new mines .

• Accessibility to required mining technology is minimized, although the World Bank study notes that such technology is extremely difficult to obtain outside of existing mining operations. Lack of this technology has retarded mining development in areas where private capital is unwelcome.

• Mine development and marketing risks are grossly under-estimated. These remain major hazards in the industry.

• While three companies account for virtually all of Manitoba's mining activity, no recognition is given to the fact that hundreds of other companies have unsuccessfully spent vast amounts on exploration in Manitoba over many years. It is only reasonable that these high-risk expenditures be included — which they were not — in calculating the industry's profitability.

• Contrary to the report's contention, the existence of resources does not ensure their exploitation. First, they must be found — a fact that requires a massive commitment of high-risk capital. Based on averages, a provincial government-operated exploration program of $4-million to $5-million annually might succeed in locating an exploitable deposit once every six to eight years (the World Bank Study notes that $33-million is spent on exploration for each commercial deposit developed; many deposits being only marginally profitable).This is a far cry from the optimistic picture presented in the Manitoba report.

(In his report, Mr. Kierans visualizes only government-sponsored exploration at an annual cost of between $4-million to $5-million. He presents what he calls a prospectus showing how a Crown Corporation would fare. The prospectus suggests that, from an initial investment of $25-million in a new mine, annual earnings would be $12.8-million on gross reserves of $27-million.

(He continues: "Would a province have any difficulty in obtaining capital? None whatsoever! With a payback period of two years, temporary bank loans would be sufficient, or production loans from customers! In two years time, a second mine could be started and the two together would finance another at the end of the third year . . . One can easily visualize a period, 10 years hence, when 10 mines fully paid, would be throwing off profits of $128-million annually on sales of $270-million to be used in strengthening and broadening Manitoba's economic base. Compare this initial investment of $25-million with the hundreds of millions poured into Hydro development over a 10-year period.")

Mr. Kierans' extraordinary imaginative faculties — his easy visualization of 10 mines in 10 years "throwing off profits of $128-million annually on sales of $270-million" — are unique in their application to mining economics. After 50 years of hard work, Noranda has only achieved annual profits of $64-million!

Indeed, it might be suggested that Mr. Kierans is conservative with his projection of only 10 mines in 10 years. If he followed his own progression of the first three years through to the 10th year, he would have 36 operating mines! Had anyone tried to pass off a prospectus such as the one outlined in the report on Mr. Kierans when he was president of the Montreal Stock Exchange, he would have treated him with derision.

In connection with Mr. Kierans' projections, certain data developed by the recent World Bank study are pertinent:

1) About $1-billion (U.S.) is spent annually on world mineral exploration, with 70 per cent of the total directed to exploration in the U.S.S.R., the United States, Australia and Canada.

2) World value of 1970 mine production (excluding China) was $25-billion (U.S.). Investment in place to achieve this production level was $50-billion.

3) Excluding exploration expenditures, $3 of capital investment is typically required today to produce $1 in annual gross revenues from a new mine.

Preconceived Prejudices

In a recent letter to The Toronto Star, Mr. Kierans contended his figures relating to royalties and taxes should stand "until real critical analysis, not empty rhetoric, convinces us otherwise." His letter was prompted by the newspaper's admission of having previously erred in too readily accepting at face value — and supporting editorially — some overstated arguments by Mr. Kierans against the mining industry. The report's main proposals have been rejected as too drastic by the Manitoba government.

It will be difficult to convince the report's author that a distinguishing feature of his study is its conspicuous absence of *critical* analysis. Almost all of the basic premises from which the report's conclusions are drawn can be shown to be either distorted or invalid.

It is obvious from his study that Mr. Kierans is intellectually wedded to the Carter Commission recommendations on tax reforms and is annoyed they were not totally accepted by the federal government. He seems to blame the mining industry for this and for the fact that the orginal recommendations were modified, although the reformed tax system will — in the industry's opinion — seriously affect future Canadian mining development. Under new tax regulations, mines will pay a minimum of 48 per cent of the their taxable income to governments from the time they begin to generate profits.

Mr. Kierans states that his resources policy "is not a question of capitalism or socialism." This statement is true as far as it goes, because conventional socialism contemplates nationalization with compensation. What Mr. Kierans proposes is confiscation without compensation — almost exactly the same approach, backed by the same rationale, as that followed by the present Chilean government in its confiscation of industry in that country.

Second in a series on regional Noranda Group operations

ALUMINUM

Annual production of about $80-million worth of aluminum metal and products by Noranda Aluminum Inc. and Norandex Inc. — two U.S. entities in the international Noranda Group of Companies — has made Noranda a vigourous new factor in the U.S. aluminum industry.

In 1967, Noranda Inc. acquired the Cleveland-based aluminum fabricating operations of what is now Norandex. This enterprise currently manufactures the most complete range of aluminum building products in the U.S. industry and operates the largest company-owned distribution network — 88 branches in the Eastern and Central regions of the United States.

Norandex 'Weather-tite Aristocrat' aluminum products are manufactured from metal produced by Noranda Aluminum at its modern primary and secondary producing complex near New Madrid, Mo. First metal at Noranda Aluminum's reduction plant was poured in February, 1971 — a little more than a year after the adjoining mill started production of aluminum electrical conductors.

Norandex and Noranda Aluminum have a combined workforce of about 2,000.

Automatic unloading of alumina from a barge at the modern Noranda Aluminum dock on the Mississippi River.

Modern Missouri Complex Most Automated in Industry

Seen through a Southeastern Missouri night, Noranda Aluminum's operations present an animated scene of brightly-lit structures along the west bank of the Mississippi River, five miles south of the City of New Madrid, Mo.

The view is also impressive by day.

The company's aluminum producing complex, dominated by the 600-foot high stack of a new power station, covers about one-third of the 4,200-acre St. Jude Industrial Park. Noranda Aluminum is the only industry in the well-serviced park, although confidence is high that others will be established there.

Cotton and other crops were harvested here in 1967 — the year before Noranda Aluminum Inc. was formed by the parent Noranda Mines Limited of Toronto. The transition from farmland to industrial site was underway in June, 1968, when Governor Hearnes of Missouri presided at a ground-breaking ceremony for the extensive aluminum complex that was to rise on the site.

The Noranda Aluminum project was completed in two principal stages:

A rod, wire and cable mill was constructed in 1969 and commenced production of aluminum electrical conductors late in that year. The plant has an annual production capacity in excess of 50 million pounds of aluminum conductors.

First metal at the nearby reduction plant was poured in February, 1971, and marked the entry of Noranda Aluminum as the twelfth primary aluminum producer in the U.S. industry at that time.

In 1972 — its first full year of production — the reduction plant exceeded its annual rated capacity of 70,000 tons of aluminum metal. It was recently described by Alfred Powis, Noranda Mines' president, as "one of the smoothest-running aluminum plants in the world." The plant is designed for future incremental increases in production capacity to a maximum of 200,000 tons of metal a year.

The capital cost of the plant and related facilities was more than $100-million, with the main portion of financing — $85-million — obtained through an issue of industrial revenue bonds guaranteed by Noranda Mines.

The City of New Madrid raised $98-million for the construction of a 600-megawatt coal-fired electric generating plant in the new industrial park. Additional financing, however, was required to complete the power plant which came into operation during the second half of 1972.

Financing arrangements for the aluminum facilities and the power plant involved the largest single industrial revenue bond issue in Missouri's history.

Operated by Associated Electric Cooperative of Missouri for the City of New Madrid, the power plant supplies Noranda Aluminum with a continuous flow of 125 megawatts of electric power. The balance of the generating station's output goes into Associated Electric's grid. This utility is scheduled to start construction on a second coal-fired generating station — also with a capacity of 600 megawatts — in St. Jude Industrial Park this year.

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The Old New Madrid

Described by its chamber of commerce as the "oldest American city west of the Mississippi," and more recently as "the home of Noranda Aluminum," the City of New Madrid is proud of its heritage.

Below: the Methodist Church of New Madrid — founded in 1810 — is the oldest Methodist church west of the Mississippi.

Right: Restoration of this 1830 house is being carried out by the Missouri State Park Board which acquired the property along with 14 acres of ground in 1968. The house was built by William S. Hunter whose descendants are active in community banking, commerce and farming. Once the Civil War headquarters of Brigadier-General John Pope (Union forces), the old house and its original furnishings will be on public view when restoration is completed. Surrounding grounds will become a public park.

Insert right: The New Madrid County Courthouse, constructed in 1918, was renovated a few years ago.

Aerial view of the Noranda Aluminum complex and (insert) the new power station.

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Strategic Location

Its mid-U.S. location — almost equal distance between St. Louis and Memphis — gives Noranda Aluminum an important advantage in distributing products to major domestic markets. The location is served by an excellent rail and highway system.

Through its international interests, the Noranda Group of Companies is active in exploration and the production and marketing of more than a score of metals and non-metallic minerals, together with the manufacture of metal products. While the Noranda name has long been established in the world's leading metal markets, it still has "newcomer" status in the U.S. aluminum industry.

In an American aluminum market, which is recovering from a period of slow demand, low prices and excess capacity at major producing facilities, Noranda Aluminum is emerging as a vigourous factor.

In addition to operating above its rated capacity during 1972, the Noranda reduction plant — one of the most highly automated in the world aluminum industry — produced metal of a purity that was among the industry's highest. The plant's metal output (sheet ingot, extrusion billets and casting ingot) had an average 1972 grade exceeding 99.85 per cent and the average was higher during the first half of 1973.

Integrated Operations

Between one-quarter and one-third of the reduction plant's metal is supplied to Norandex at Cleveland; approximately one-sixth of its output goes to the adjoining rod, wire and cable mill in the form of molten metal.

Altogether, between 40 and 50 per cent of the reduction plant's output is used in the Noranda's Group integrated U.S. aluminum manufacturing operations. The balance — mainly in the form of extrusion billets — is sold to Noranda customers from Texas to the Northeastern states.

The rod, wire and cable mill, which receives molten metal from the reduction plant's metal services department, increased its shipments of aluminum electrical conductors by 50 per cent in 1972. Shipments are expected to rise by a further 25 per cent this year.

The mill's range of more than 35 standard-size conductor products are turned out by machines capable of producing — in a single pass — cables containing as many as 84 strands of aluminum and 19 strands of steel. The conductors are sold to utilities for use in high voltage lines throughout the United States.

Combined annual sales of metal and conductors marketed by Noranda Aluminum is approximately $35-million.

Raw materials used in the production of aluminum metal are transported to the Noranda complex by barge and by rail (out-going shipments of metal and conductors are made by rail and by truck).

At Noranda's modern dock on the Mississippi, alumina is automatically unloaded on to a conveyor system from barges which take from 10 days to two weeks to complete the 650-mile journey upriver from Baton Rouge, La. The alumina is supplied under contract by Kaiser Aluminum and Chemical Corporation.

The alumina-carrying barges, which are each capable of moving 1,500 tons of the material, take about 16 hours to unload — an activity that is conducted day and night. Calcined petroleum coke is also barged upriver from New Orleans — an intermediate point in the material's movement 1,174 miles from Port Arthur, Texas. Cryolite and related materials, used in the aluminum-making process, are received by rail.

At Noranda Aluminum, the visitor invariably is impressed by the size and efficiency of the production facilities;

the two long buildings — each 1,750 feet in length — that contain the reduction cells in which molten metal is produced, the computerized controls, laboratories for quality control testing, the streamlined mill, power plant, modern wharfage for handling raw materials. These all add up to a composite of efficiency — reflected in one of the highest "productivity-per-man" ratios in the aluminum industry.

Manpower. It's still an essential ingredient in an automated and computerized industrial environment. The fact is emphasized at Noranda Aluminum.

"The big thing we have going for us here is the people . . . we have what I believe is the best group of people in the industry," asserts Clint Halstead, Reduction Plant Manager and Manager of the adjacent rod, wire and cable mill. He should know. Mr. Halstead, a graduate mechanical engineer, came to Noranda Aluminum in 1970 with 18 years of supervisory operating experience from Reynolds Aluminum at Massena, New York.

The Noranda Aluminum 'group' at St. Jude Industrial Park is headed by Bruce R. Allan, Vice-President and General Manager. A graduate of the University of Toronto (B.A.Sc. in 1944 and M.A.Sc. in 1946), Mr. Allan is an executive with long experience in the North American aluminum industry.

Noranda Aluminum employs some 500 persons, including marketing personnel. For the statistically-minded, about 85 members of the management staff have a combined experience in the aluminum industry of more than 600 years.

Almost all of the employees have deep roots in Southeastern Missouri. Daily, they travel to the Noranda complex from areas within a radius of 40 miles of the industrial Park.

"We have appointed first-line supervisors from among local people who were trained on the job," says Mr. Halstead, who is also a Southerner. The policy of continuous on-the-job training and promotion from within has helped in maintaining a stable workforce.

Noranda Aluminum has its own sales division with headquarters at the New Madrid complex.

The impact of the company's operations on the region's economy is significant. Noranda Aluminum's payroll, for example, is about $5.5-million a year. The company also spends some $15-million a year on raw materials brought mainly from outside the region; $6-million on services such as electric power and gas; and about $500,000 on freight.

And the future? One measure of the confidence in the operations' outlook was indicated by Alfred Powis at the recent annual meeting of Noranda Mines. Referring to the substantial investment made as part of the orginial project to accommodate additional capacity at the reduction plant, he commented that investigations are underway into the most appropriate course of action for the future.

Charging a holding furnace in the Metal Services Department of Noranda Aluminum's reduction plant.

SOUTHEASTERN MISSOURI

MISSISSIPPI RIVER TOWNS RETAIN FLAVOUR OF THE PAST

Motel bills paid and receipts stuffed into wallets, the two visitors discussed their final call before driving the 170 miles north to St. Louis from New Madrid in Southeastern Missouri.

They were anxious to get going. News reports told of severe flooding in the St. Louis area from the Missouri and Mississippi rivers. Heavy rain was forecast for the State's southeastern region through which Interstate Highway 55 dips at some points to the level of the lower Mississippi.

As they walked toward the motel exit, the cashier who processed their bills called after them: "Now, you all come back again — and don't forget!"

Never mind that "you all" referred to just two persons. The parting invitation, given in a low Southern accent, reflected the courtesy and easy hospitality a traveller encounters in this region.

Southeastern Missouri lies south of St. Louis where undulating land soon gives way to miles of unrelieved flatness. Through the eastern section of the region, old towns — each with its niche in U.S. history — reach back from the banks of the Mississippi.

The region includes Missouri's odd heel-like thrust between the States of Arkansas and Tennessee. This geographic intrusion, aptly named the Bootheel region, was included in Missouri at the insistence of the Houch family — former owners of vast land holdings in the area — when the state was admitted to the Union in 1821.

A visitor, if he can, should select his season for travelling here. Movement during the long and frequently humid summer is mainly within an air-conditioned world. But spring, which arrives early, is a good season to see Southeastern Missouri. March is a month of colour, precociousness and promise in the flatlands and towns on either side of the swollen Mississippi. It is a diversified agricultural region with a 180-day growing season.

Low land, reclaimed years ago from marsh and swamp, is vulnerable in the spring to the high waters of the Mississippi. The 2,350-mile long river is the main artery of a system that drains a 1,245,000-square mile area, including parts of Southern Canada and all, or parts, of 31 American states.

Although flood-control structures protect river-side land and towns for long distances from the seasonal rise in the river and spillways are used to divert overflows, large scattered tracts of flooded land are evidence of the Mississippi's capricious spring behaviour.

The low land dries out in summer and the river conforms to a predictable pattern.

Cotton Country

A visitor with a sense of novelty and, perhaps, nostalgia may stop along the way here in the fall and pick a bagful of cotton. He may watch a cotton-picking machine in operation, or follow some cotton-laden trailers to a local gin and view the machine-separation — ginning — of cotton from its seeds. Outside interest is welcomed.

If time permits, he might turn off the interstate highway into one of several small or medium-size towns; a drive, if he is curious, into a region's history. Sign-posted place-names tantalize: Cape Girardeau, Cairo (Ill.) on the river's east bank, Scott City, the City of New Madrid, Portageville. And there are others.

Some are imaginative place-names and, maybe, they sound a little ambitious for the towns they represent until the traveller understands their chequered past. There are few illusions or pretensions in these communities.

In the mid-Nineteenth century, they were bustling river ports. Their growth in earlier decades was prompted by initial trade on the Mississippi by flat boat, raft and keel boat. In the 1830s, transport by river steamer marked a new era for the Mississippi, its prosperous ports, and for the American mid-West and West.

Steam-powered vessels became more elaborate, the river's trade more lucrative and the Valley of the Mississippi became increasingly settled by a sturdy frontier people. St. Louis emerged as a major departure centre for emigrants heading out to the expanse of territories that lay to the west.

Past Revived

The Mississippi, which was used as an important invasion route into Confederate territory by Union forces during the Civil War, never fully regained its commercial prominence after the defeat of the Confederacy. Steamboat traffic resumed, but the expansion of railways and a depressed Southern economy eventually led to a decline of the river ports. Along with the river, the riverside communities with their semi-Southern atmosphere were perpetuated in the celebrated works of Mark Twain, one of Missouri's most famous sons.

While traffic on the river today is heavy, the Mississippi no longer is a vital transportation route.

If the visitor to Southeastern Missouri is lucky — and still curious — he might encounter a history buff like Jack Long, a former state surveyor and now municipal engineer for the City of New Madrid. The word that Mr. Long was a man to see — and listen to — was passed on by Clint Halstead and Bill Cooper of Noranda Aluminum.

The walls of the narrow corridor leading to Mr. Long's office in the municipal building give the visitor a premonition of what to expect. They are lined with maps and photographs of old New Madrid. His office is a miniature museum. More old maps grace the office walls; a small cannon is set high on a wooden stand; Civil War period rifles are displayed on the wall behind his desk.

Mr. Long is happy to discuss local history and regrets that "people don't seem to bother that much about history . . . it's hard to get them interested." But after listening to him for a while, the visitor gets the impression that Mr. Long's unbounded enthusiasm for his subject would be difficult to match.

He described how he recovered — dug from the mud by himself — mementoes of local significance. An old bronze bell — there's a photograph of

it on the office wall — cannon balls of various sizes, artillery pieces.

Some of the bitterest fighting between Union and Confederate forces took place around New Madrid and for Island No. 10 that lies six miles upriver from the community. The island was so named because it was the tenth island below the Ohio. In terms of local history, "it was declared by military strategists to have no superior above Memphis as a position for repelling the enemy (Union forces) and protecting the Mississippi Valley."

Settlement and Recent Discoveries

The City of New Madrid, described by its chamber of commerce as the "oldest American city west of the Mississippi" and now "the home of Noranda Aluminum," straddles a curving west bank of the lower Mississippi at a location some five miles north of the Noranda complex in St. Jude Industrial Park. It is approximately 170 miles south of St. Louis and 120 miles north of Memphis.

Modest in size — the population is about 3,000 — New Madrid probably packs more history and turbulence into its past than any other community with which the international Noranda Group of Companies is associated.

Two Canadian trappers — François and Joseph LeSieur — are credited with the first recorded settlement — in 1783 — on the present site of New Madrid. Here, they established a centre for trade with regional Indians. It became known as L'Anse à la Graisse (Cove of Fat) because of the abundance of local bear meat.

Descendants of the LeSieurs still live in the area. A visitor, for example, may shop at LeSieur Jewelry Store at 319 Main Street, New Madrid.

François LeSieur also established settlements some miles to the south of New Madrid on the Mississippi at the present locations of Point Pleasant and Caruthersville. It's certain, however, that the LeSieurs were not the first permanent settlers at New Madrid.

The discovery three years ago of the remains of a 1,000-year-old Indian village six miles west of New Madrid confirmed the existence of an advanced Indian civilization that preceded the American Indian. Identified by Missourian anthropologists as "Mississippians' " these people lived on permanent sites in areas conducive to farming and fishing. The village unearthed near New Madrid was surrounded by a wall of posts sunk into the earth.

Reporting on the discovery, The Sikeston Standard, a regional daily newspaper, noted that "inside the (village) wall were areas used for houses, burial, tool and pottery manufacturing activities." Skeletons and artifacts were uncovered during excavations. The site now is regarded as one of Missouri's most complete examples of Mississippian Indian culture.

New Madrid — the 'a' in Madrid is emphasized — received its name from Colonel George Morgan, a former Revolutionary War officer. In 1789, he had grandiose plans for establishing there a new capital of the Spanish Empire under whose jurisdiction the region then came. His plan for a city of broad streets, built around a lake and adjacent parkland, encompassed an area two miles long and four miles wide. A conservationist, Morgan's plan incorporated protective measures for forests and game; Indian dependence on hunting would be safeguarded by regulations forbidding professional hunting by white men.

The Morgan plan was undermined by Spanish hesitancy to grant him a large land tract he sought for a colonizing venture. He was also the victim of rival jealousies. By the time a modified land grant was offered to him, his interest in New Madrid had waned. Morgan went to Pennsylvania to inherit a brother's estate.

Indian, Spanish, Canadian and French influences lingered on after the vast region north of New Orleans was acquired by the United States from France under the Louisiana Purchase in 1803.

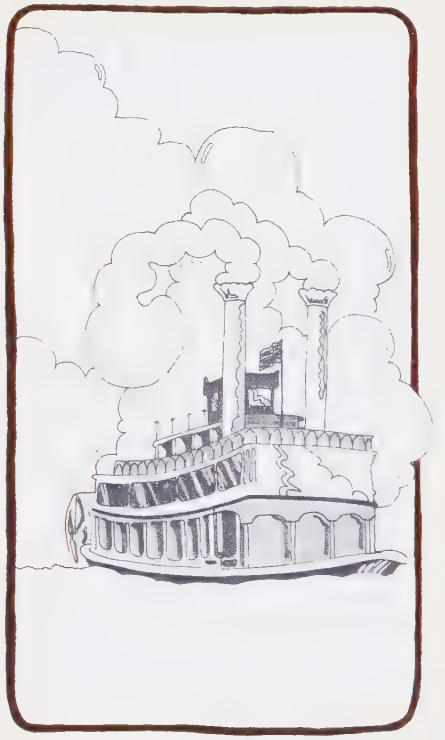
Notable events in the New Madrid area during the last century included a series of earthquakes in December, 1811, and the Civil War that was fought across this and other regions.

About the earthquakes, a local resident had written in 1811 of the earth "in continual agitation, visibly weaving as a gentle sea." It was a poetic description of earthquakes that had forced the inhabitants of New Madrid to go north to higher ground near Sikeston, about 25 miles away.

During the Civil War, New Madrid came under siege by Union forces in March, 1862. Following two weeks of intermittent fighting, Confederate troops withdrew from the town, although other Confederate forces held the strategic and well-fortified Island No. 10 until the following month.

For a long period after the Civil War, the New Madrid harbour, according to local records, continued as a busy river port. Its decline came as the population increasingly turned to farming.

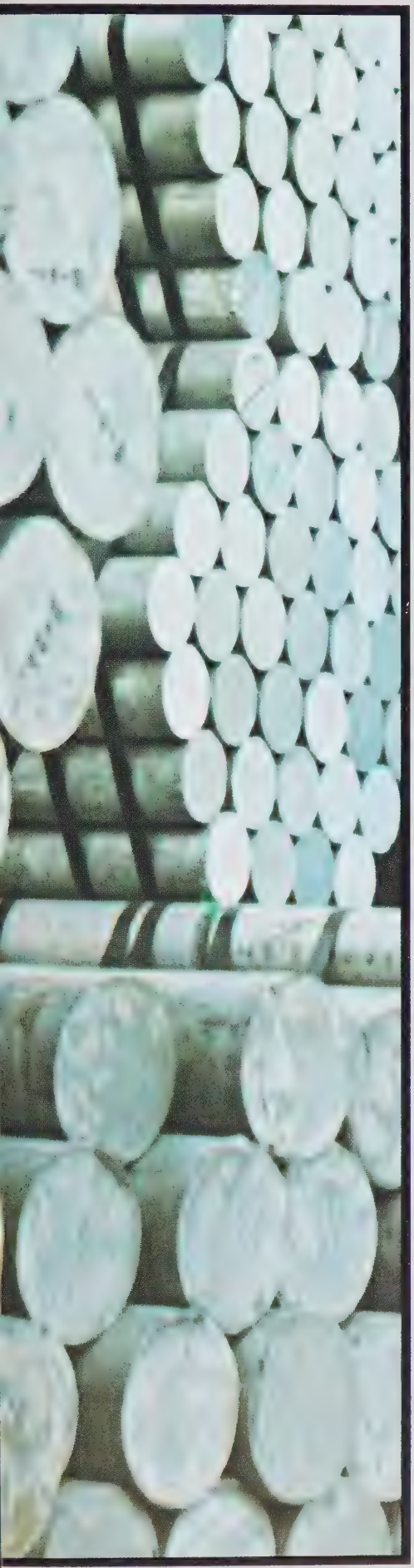
Farming is still a predominant activity. But stimulated by construction that preceded the establishment of the Noranda complex and the subsequent sustained employment generated by the operations, the City of New Madrid is now one of the region's most active communities in its endeavours to broaden further its economic base.



Norandex Industry Leader Product Range, Distribution

Norandex assembly line and fabricating aluminum windows at the Cleveland plant.

Aluminum billets arrive at the Norandex plant at Cleveland from the New Madrid reduction plant of Noranda Aluminum.



"You'd like to tour the operation?" asked Ron Rowe, Manager of Marketing for Norandex Inc. of Cleveland.

An affirmative nod sent him striding through a maze of offices to a door leading into the plant.

Inside the entrance, a half-dozen bicycles were parked — some on stands, others at awkward angles to a nearby wall. The bicycles are used to get around the 15-acre expanse of Norandex production facilities.

Mr. Rowe selected a machine, signalled the two visitors to do likewise and, as an afterthought, expressed the hope they could ride the bicycles. As he had already started to pedal, his solicitude was superfluous. Assuming a nonchalance unwarranted by their shaky start, the visitors followed.

An "in-plant" tour of the Norandex operation near Cleveland — the plant is actually located in suburban Walton Hills — is an informative experience. Hazards encountered by the unskilled cyclist . . . weaving unsteadily past battery-powered vehicles . . . sudden and precarious braking in attempts to negotiate sharp turns — all lose significance as interest increasingly is focussed on the diversity of production lines.

An imposing coil-coating line — the largest in the U.S. aluminum building products industry — was recently expanded at a cost of $500,000. The completely automated installation cleans, surface-conditions, paints and "cures" a continuous strip of 20-inch-wide aluminum at a rate of 300 feet a minute.

Aluminum billets, supplied by Noranda Aluminum Inc. from its Missouri reduction plant, are automatically processed into extrusions by three presses that operate on a 24-hour basis. The extrusion presses, which include two 1,650-ton and one 1,250-ton Sutton presses, enable Norandex to produce both standard and custom-designed extrusions under exacting quality control conditions.

Custom work — production of aluminum items to specific customer requirements — represents an important activity throughout the plant's operations. The tour continues on through a succession of departments where the production and assembly of a seemingly endless variety of residential and other aluminum products are handled by the plant's 650 employees.

The major product range is impressive.

The Cleveland area plant manufactures eight styles of aluminum siding in 12 different colours; three basic styles of prime windows in a wide variety of sizes; seven types of storm windows in four different finishes, rain-carrying equipment, sliding glass doors, storm doors, shutters and awnings, carports, mobile home skirting, decorative trim and aluminum hog floors.

Happy Hogs

Aluminum hog floors?

The company's innovative capabilities appear at times to take unusual directions. Norandex successfully developed an award-winning aluminum hog floor which, among other advantages, "provides a more stable floor which reduces anxiety stress (in hogs) adding to animal comfort and increased profits."

Both The Aluminum Association and The Aluminum Extruders Council have honoured Richard Torbett, Norandex design engineer, for the originality and practicality of the aluminum hog floor. Besides keeping pigs happy, the floor — marketed under the Norandex Shur-Lok trade mark — offers economies in installation and maintenance, greater safety and durability than other forms of hog-barn flooring systems.

Modest Beginning

There are many facets to Norandex.

John Duhan, President, lists the company's functions under three divisions: Weather-tite (building materials); Real Estate (leasing of surplus warehouse space); and the Westley Industries' manufacturing operation at Cleveland. The company employes 1,500.

The Weather-tite Division had its origin shortly after World War II as a small manufacturer of aluminum storm windows and doors. During the 1950s, it opened 14 branches and later expanded into the aluminum siding and prime window market. Growth during this period included acquisition of an aluminum fabricating (windows and sliding doors) operation at Jacksonville, Florida.

The manufacturing and distribution facilities were owned by The Pacific Coast Company until 1967 when Noranda Inc., a Noranda Mines subsidiary, acquired a 96 per cent interest in the company for $26-million. By that time, the Weather-tite operation had enlarged its network of branches to 96 in the Eastern and Central regions of the United States.

Commenting on the acquisition, Executive Magazine described the Noranda purchase as an example of reverse integration into basic aluminum.

Processing billets into aluminum extrusions at the Norandex Cleveland plant.

"The building materials extruded in Pacific Coast's main Cleveland plant (and in a smaller Florida facility) represent a future annual consumption of 30,000 tons of aluminum," the magazine noted.

The Noranda Group's acquisition of Pacific Coast was directly related to the decision to establish the primary metal and manufacturing plants near New Madrid. The move first into fabricating did, indeed, have the appearance of reverse integration. It had been the pattern for primary aluminum producers to become fabricators of their metal and to use manufactured products as a means of selling aluminum.

Contrary to a widely-held belief, the Noranda Group was not new to the aluminum sector. Canada Wire and Cable Company, a Noranda subsidiary, was involved in the development of aluminum conductors before World War 1.

In 1954, Canada Wire designed and manufactured a grounded neutral cable which represented the world's first commercial use of an all-aluminum high-voltage cable. Ten years later, this Noranda subsidiary was by far the largest non-captive aluminum consumer in Canada. The company subsequently initiated intensive studies for the Noranda Group on the feasibility of establishing primary aluminum producing facilities.

From metal supplied by Noranda Aluminum, Norandex now produces the most complete line of residential aluminum products in the U.S. industry. In addition to the broad product range from its Cleveland area plant, the company produces aluminum windows and sliding glass doors at its Jacksonville plant.

Largest Distribution System in Industry

Norandex also operates the most extensive company-owned distribution system for aluminum building products in the United States. Its transportation fleet of 40 tractors and 60 trailers supply 88 company warehouses which, in turn, service some 20,000 customers in 30 states.

The company's primary market — accounting for 70 per cent of annual sales of $44-million — comprises small and medium-sized builders and home remodellers. An important secondary market includes department and discount stores, lumber yards and recreational vehicle manufacturers.

Versatility is emphasized. Where a product need exists, the company moves to fill it even when this involves extending the product range to non-aluminum items. Norandex constantly seeks ways to offset the impact on its operations of normal seasonal fluctuations in demand for aluminum building products.

Under the Weather-tite Aristocrat brand, it markets its own manufactured products. Norandex also distributes — but does not manufacture — supplementary non-aluminum items such as vinyl and steel siding, steel entrance doors, wood-fabricated kitchen cabinets and carpeting.

Norandex Aristocrat carpets are made specifically for the company by a Dalton, Ga., firm. The carpets, which are available to Norandex customers in 16 styles of synthetic fibre, now account for annual sales of some $2-million — double the sales volume of a year ago.

"It's an example of what we're doing to ease the impact of seasonal fluctuations in aluminum product sales," Mr. Rowe comments. Similar thinking influenced the decision to add wood-fabricated kitchen cabinets — another indoor item — to the Norandex product line. The cabinets are manufactured by three Cleveland-based companies.

88 Separate Businesses

The company's warehouses — they are really self-contained branches with a large degree of autonomy — are manned by 530 Norandex employees, including district managers, branch managers, salesmen, warehouse and office personnel. Employees at these centres have a background in aluminum material salesmanship.

"The warehouses are, in essence, 88 individual companies, each with responsibility for local sales of $500,000 to $1-million and the supporting ordering,

One of 60 Norandex trailers used for transporting aluminum building products from the company's plants at Cleveland, Ohio, and Jacksonville, Fla., to the Norandex network of 88 branches in the Eastern and Central regions of the United States.

warehousing, inventory, delivery and billing functions," the company says.

Norandex emphasizes efficient delivery; each warehouse receives a shipment of products every week and the company is constantly examining ways to improve its distribution. A major step in this direction is the current move to establish district warehouses from which branches will be able to draw their supplies as well as from the Cleveland and Jacksonville plants.

At the Cleveland headquarters, regular reports from branches are correlated, studied and used as a basis for identifying problems, opportunities and for setting priorities. Market research activities were initiated during the past year at the local branch level.

The Norandex network of branches is divided into seven districts — each the responsibility of a district manager who may supervise from nine to 16 branches. Besides attending a number of sales meetings each year at the company's head offices, the district managers also oversee local and regional meetings of Norandex sales personnel. Ongoing training of staff stresses practical aspects of their jobs.

The Westley Division produces and distributes car wax, windshield washer fluids, de-icers and related auto products. Employing about 14 people, the division's products are marketed through retail auto accessory outlets.

Employing 1,500 people, Norandex produces the most complete range of residential aluminum products in the U.S. industry. It also operates the industry's largest company-owned distribution network. Locations of the company's manufacturing plants and its 88 branches are indicated on the map above.

Norandex has approximately $25-million in employed real estate assets — its warehouses. Surplus space is leased to other companies and the responsibility for ensuring maximum use of this division's assets rests with Don Epp, Norandex vice-president. Mr. Epp also heads the company's Westley Division.

Noranda in Quebec Review in Next Issue

The Noranda Group's Quebec operations will be reviewed in the September issue of Horizons.

Salient aspects of the Group's investment in, and contribution to, the province were outlined early in June by Alfred Powis, Noranda's President, in an address to the annual meeting of the Quebec Metal Mining Association. Among the highlights:

- The Group operates seven mines, two smelters, two refineries, nine manufacturing plants and a research centre which, collectively, employ more than 8,000 persons.
- The Group's direct annual payroll, including fringe benefits, is about $80-million.
- Dividends of almost $7-million were paid in 1972 to 5,600 Quebec residents who own 23 per cent of Noranda's shares.
- Total taxes of all kinds accrued against Noranda operations in Quebec last year were about $30-million, of which $22-million were paid ($13-million in the province) and $8-million deferred because of substantial capital programs. After-tax earnings from the Group's Quebec operations in 1972 totalled some $26-million, or 40 per cent of overall profits.
- Purchases of goods and services related to operations and capital programs amounted to nearly $140-million — spent in Quebec — during 1972.
- The Group has reinvested earnings exceeding $500-million in Quebec since completion of the original Noranda installations in 1927. The cumulative investment in unsuccessful exploration exceeds $50-million.
- In the more than 20 years since the Gaspe Copper development started, the Group has invested more in the Gaspe Copper operations than it has received back in cash flow.

CORRECTION

Horizons incorrectly transposed the terms "depletion" and "depreciation" in the first column of an article by A. H. Zimmerman in the magazine's spring issue. Mr. Zimmerman was referring to depreciation and not depletion in the column in question.

An Opportunity for Industry

Student Summer Job Programs

"It makes good sense to hire a student this summer," exhorts the government-sponsored commercial which proceeds between jingles to extol the willingness of students to perform a variety of summer jobs.

The advertising pitch on behalf of students may have a ring of redundancy about it for many institutions which are already deeply involved in summer placement projects. Yet the commercial and other appeals serve to keep attention focussed on a serious problem.

Providing *meaningful* summer employment for students has assumed greater economic and social significance — a factor that is recognized by institutions conscious of added expectations related to their roles and responsibilities.

Changing Conditions

Summer placement programs for students are not, of course, new; they have been supported over many decades by both the private sector and by governments. The adequacy of existing programs, however, was strained by at least two important developments that emerged in the post-World War II period.

The first was the rapid expansion of universities, community colleges and technical trade schools. During the past 15 years, particularly, this development resulted in the retention within the educational system of many more thousands of students who, formerly, might have been expected to enter the regular workforce after completing high school, or to embark on on-the-job apprenticeship schemes. The temporary summer employment market was hard pressed to cope with this influx of additional job-seekers.

The second development involved behavioural trends and, specifically, student attitudes toward business and other sectors. The decades of the Fifties and, in particular, the Sixties were characterized by widespread student unrest — on and off campuses. Minority dissent, including hostility to established institutions, was at times projected — and erroneously interpreted — as the mood of the student majority.

An evaluation study based on 528 interviews with 53 students employed during the summer of 1971 by Northwood Mills Ltd., a Noranda subsidiary, concluded that the students interviewed were not against industry; they were simply unaware of it and did not understand it.

"Student value judgements are made on hearsay," the study suggested. That was two years ago. Six years earlier, a University of Windsor seminar on the summer placement of engineering students concluded that any resolution of the problems of vacation employment as an effective contribution to engineering education depended upon better communications between industry and university.

Industry and government have realized that jobs alone are insufficient for developing informed student attitudes toward an industrial environment. Industry is progressing from an era when companies hired students primarily to replace vacationing regular employees. Under this system, the benefits were purely economic and short term: companies obtained relief help and students — the prudent ones — earned funds to continue their university or other educational courses.

Unquestionably, the temporary replacement of vacationing employees remains a valid reason for hiring students. For an increasing number of companies, however, it has become one among several objectives.

Summer Jobs and Student Attitudes

When the Noranda Group Student Employment and Communications Program was standardized two years ago, Alfred Powis, Noranda's President, emphasized the relationship between summer jobs and attitudes formed by students toward business.

He said: "Perhaps generally overlooked (in summer placement programs), but vitally important, is the fact that the training of young people and the attitudes they develop — particularly university and college students — will determine our future social and economic system."

Wherever feasible, Noranda Group operations were asked to establish a training and information program for the purpose of promoting constructive and regular dialogue between students and management. It was suggested that programs at individual operations be placed under the direction of a carefully-selected member of the management team.

Guidelines for the composition of programs included: initial orientation sessions for student employees, regular management-student discussions, tours of installations and of other Noranda operations where possible, involvement in training and accident prevention sessions, individual interviews, and participation in evening or weekend social functions.

While development of informed student attitudes — toward business generally and toward the Noranda Group, in particular — was a major purpose of the broadened Noranda program, a number of other objectives were outlined:

- Continuing emphasis on performance of necessary and meaningful work, including replacement of vacationing regular employees;
- Providing students with income-earning opportunities to assist them in financing their further education;
- To function as an adjunct to the Group's existing technical and professional recruitment program;
- Improving the Group's relations with employees, the communities in which it operates, educational institutions and governments.

Individual operations, which are responsible for student hiring, are encouraged to employ as many students as possible for the summer. Obvious limitations on what any one operation can do include financial considerations and availability of work.

As a guideline, it was pointed out that the Group had been employing one student for approximately every 12 regular employees — a ratio that well exceeded the one-to-20 figure recommended by "Operations Placement" — the student employment scheme promoted by the Canadian Chamber of Commerce and the federal Manpower Department.

It was also stressed to local management that a primary purpose of the program — development of informed student attitudes — is not served if students are assigned to make-work positions that benefit neither student nor employer and contribute little or nothing to an operation.

Program in Operation

More than 2,000 students — equivalent to a ratio of one to every 11 employees — are working this summer at about 45 Noranda Group operations in Canada and in the United States. Collectively, they will earn about $3.5-million for work periods that may extend from four or five weeks to three months or more. The number of students employed by the Noranda Group has approximately doubled in the past six years.

Summer employment for students is more plentiful this year than in recent years because of generally improved economic conditions to date in 1973. Another factor was the lower student enrollments at Canadian universities in the fall of 1972. The increased availability of jobs for students at Noranda Group and other industry operations has given students greater flexibility than in recent years in choosing locations at which they wish to work.

The Group's current program evolved from a standard Noranda practice of summer job placements originating at the Horne facilities in Northwestern Quebec in the 1930s. Initially, summer jobs were offered to the sons and daughters of Noranda employees and approximately one-third of the Group's summer positions are still filled by students who have a parent employed by a Noranda company.

Many professional and business people, now prominent in northern communities, were helped in advancing their education by funds earned as a Noranda summer employee.

A large number of high school graduates, who had worked summers at the Group's operations, subsequently entered Noranda apprenticeship courses in electrical and mechanical engineering, pipe-fitting and welding — years before the responsibility for conducting these courses was taken over by community colleges and trade schools.

While Noranda prefers to hire students from disciplines related to the Group's operations — the sciences, metallurgy, geology, engineering and commerce are heavily represented — students are drawn from a wide cross-section of academic backgrounds. University students in the 1972 program, for example, listed 50 different disciplines — ranging from applied chemistry to zoology — and an equally broad representation of disciplines was listed by community college and trade school students. University undergraduates account for about 50 per cent of all students employed in this year's Noranda Group program.

For many of the students — the 2,000 employed this summer were selected from about 9,000 applicants — the experience is their first encounter with industry following 12 or more years in the educational system. The Noranda Group and many other enterprises have already given a positive answer to the often-asked question of whether management should be concerned about how these young people respond to their initial association with industry.

How, in fact, do they respond? And management — how does it regard the students, their ideas, motivations and performances?

In summarizing the evaluations by students and management of the 1972 Noranda Group Student Employment and Communications Program at more than 40 locations, T. R. Rudnicki, Noranda's Co-ordinator of Technical Employment, noted that, while there were "inevitable variances in evaluations" of the program, the consensus of management and students was that the program was justified, had considerable merit and should be continued. At the same time, both management and students felt a need existed for improved communications.

Mr. Rudnicki continued: "Management realizes that in order for students to make the transition from an educational environment to an industrial one, they must be provided with interesting and challenging opportunities wherever possible. Students realize that after working and speaking with management they can have a better appreciation of how a complex industrial organization functions, taking into account operational, financial, corporate and social goals and activities."

Slightly less than 50 per cent of all students employed last summer participated in planned communications programs which varied in format according to location and size of operation. Generally, the guidelines referred to earlier were followed.

Students' Views

At the Montreal area operations of Canadian Copper Refiners Limited, for example, 82 students — including 45 university undergraduates — took part in a communications program that included operating practices, environmental control, safety, collective bargaining and production procedures. Social events were also sponsored.

Most of the CCR student employees, who had no previous knowledge of the Noranda Group, expressed appreciation of the supervisory staff's efforts in promoting an informative program. Many students commented that industry should have started similar programs years ago.

Formal programs were well received, although at some locations informality met with more success. At Mattabi Mines Limited, management considered that personal contact with students was more effective than planned get-togethers.

Students, too, had their views. From Brenda Mines Limited came this student comment: "It was rewarding to have been able to get, first-hand, management ideas even though opinions differed."

Another student at Brenda ended the summer with definite ideas about work he did *not* want to perform: "I can't say that I enjoyed packing moly, pounding screens, cleaning up spills, washing sumps, etcetera; the most important thing I learned was that I don't wish to make my future working in a mill. I would be more satisfied working in a pit or doing exploration and development work."

The assessment by British Columbia Forest Products Limited of its program was that students were eager to work in the lumber and plywood industry during the summer and many returned for several summers until they graduated.

At Mattagami Lake Mines Limited, it was found that the number of university students returning for more than one summer of employment increased since 1970, indicating — in part — a better allround student employment and communications program.

One measure of the effectiveness of the Noranda Group program is that, in recent years, between 40 and 50 per cent of graduates hired by the Group worked for at least one summer at a Noranda operation. The initial association with the Group's operations and goals has contributed to a low turnover among permanent graduate employees throughout the Group.

An interesting sidelight to the broadened program was the attention it evoked in regular employees, many of whom felt that the communications aspect also had relevance for them. This interest by regular employees prompted an examination of ways of improving, or implementing, on-going communication programs for regular employees.

Reasons for Volatile Lumber Market

By John Balmer*

J. E. Balmer

Along with other internationally-traded commodities, lumber has recently received considerable publicity because of sharply higher prices. Unfamiliarity with the mechanics of the lumber market has led to some unfair criticism of producers who have been accused of raising prices "too high and too quickly."

Lumber prices are established almost entirely by supply-demand conditions—similar to those influencing stock markets except that there are no central exchanges where lumber trading occurs. Instead, prices are determined by literally thousands of daily transactions — usually conducted by telephone — among sawmills, wholesalers and retailers. As there are about 40,000 lumber producers in North America, even the largest among them can have only minimal impact on prices. Output by any one of the major producers represents only a small percentage of total production.

British Columbia, which has more than 100 major sawmills and is Canada's largest lumber producer, accounts for only six per cent of the world's softwood production. The Northwood Group, for example, is the world's leading supplier of spruce, but by no stretch of the imagination could the Group be considered a price setter.

International Factors

Because Canada's lumber production far exceeds domestic requirements, some 80 per cent of our lumber output is exported. Northwood, for example, exports approximately 85 per cent of its output, with 75 per cent of the company's exports destined for the U.S. market where trends exert an important influence on lumber prices generally.

In 1972, the United States experienced a record building year. Housing starts totalled about 2.3 million and, buoyed by this activity, the U.S. consumed 40.5 billion FBM of softwood lumber — a quantity which could not be supplied by American mills. To meet the U.S. demand, nine billion FBM of softwood lumber were imported from Canada.

The pressure on lumber supplies resulting from the U.S. building boom in 1972 coincided with high construction levels in Canada and in other major markets such as the United Kingdom, Western Europe and Japan.

For the first time ever, the lumber market in 1972 could be said to have reacted to international supply-demand influences. Lumber buyers in Canada and in other countries had to pay the equivalent of the U.S. price or they did not receive supplies. As usual, the Canadian market paralleled moves in the United States. In addition, the Canadian market was strengthened by continuing firm overseas demand. In spite of increased production in 1972, lumber products were in short supply on a world-wide basis. The result was record high prices.

Distribution System Efficiency Proved

Lumber manufacturers have been accused of raising prices indiscriminately — the alleged major factor in the high cost of housing. This charge is untrue. As already noted, Canadian lumber prices are directly related to world demand and no one producer can have much of an impact on prices. Lumber also moves through a chain of buyers: manufacturers, wholesalers, retailers, contractors and builders. It is evident that manufacturers cannot control the final prices charged to consumers.

The industry's distribution system, which superficially may appear to be cumbersome, has proved its efficiency over a long period. The retail lumber dealer, for example, is usually equipped to provide delivery to the homebuilder in "house bill" lots. This minimizes the cost of handling at the job site. The wholesaler, too, provides services which give some price stability and add value to the product. These services involve certain costs which are reflected in wholesaler and dealer markups — amounting to between 20 and 25 per cent.

Even after taking the added (distribution) costs into account, prices of building materials — mainly lumber and plywood — have increased by less than 55 per cent over the past 22 years. Such an increase can hardly be related to the fact that the average house price has more than doubled since 1957 and that, even now, the cost of all materials used in new home building represents less than 25 per cent of a dwelling's selling price.

Most lumber sold in North America is in carload quantities of about 50,000 FBM per car. (Northwood's production in 1973 will total about 16,000 carloads, or equivalent to 800 million FBM. Most of these carloads are sold separately to more than 500 wholesalers and distribution yards.)

To give a simplified example of how a transaction occurs: a wholesaler may phone a mill from Vancouver requesting a quote on a carload of "two by fours." The mill may quote an asking price of $200 per 1,000 FBM delivered Montreal freight rate, for a total value of about $10,000 (less usual commissions).

The wholesaler may then quote his customer (retailer, mobile home manufacturer or industrial user) who may suggest the price is too high and that he should be able to buy at $198 per 1,000 FBM delivered. The wholesaler may then negotiate the mill's price accordingly. However, while this transaction is proceeding, the mill itself may have sold five or six similar carloads at $200 per 1,000 FBM without any difficulty and would, therefore, refuse the counter offer. Furthermore, the mill may decide to raise its price to $202 per 1,000 FBM on the strength of sales already made. Other mills may have been experiencing similar activity and may also raise prices.

Many Influences

Through continual interaction between many mills and wholesalers all over North America, the lumber market swings — often erratically. In one day a mill may increase or decrease

prices several times depending on demand and on the mill's order file position. Within one week, prices may change by more than $10 per 1,000 FBM — approximately five per cent at recent product price levels.

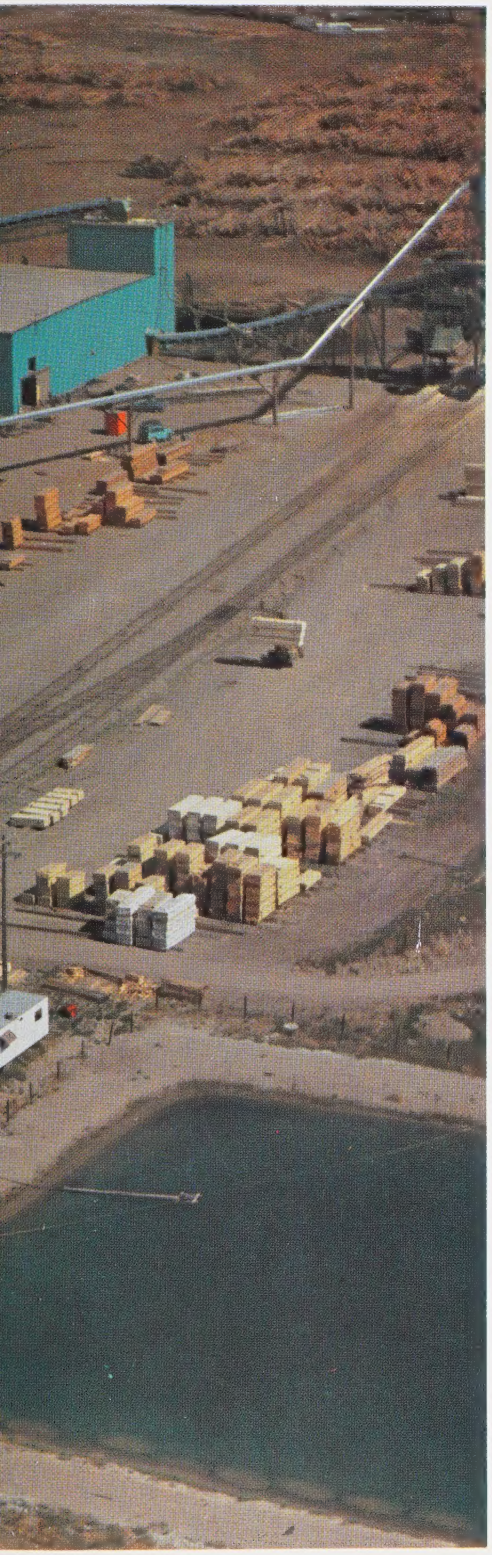
There are, of course, numerous other underlying reasons for volatile movements in the lumber market. Obvious indicators include the level of housing starts, permits issued and mortgage funds available.

In Northwood's case, the number of single-family dwelling and mobile home starts is particulary significant because of the consumption of spruce in both sectors. The number of transit or unsold cars of lumber moving to diversion points at any one time can also affect prices considerably. If the transit level is high, there is a resulting downward pressure on prices. Shortage of rail equipment prevents mills from shipping as scheduled and contributes to keeping prices at high levels.

Lumber supplies may tighten when severe weather conditions hamper logging operations. Prices are also related to the quality of a mill's product and ability to ship on time. Unlike other commodities, lumber is not a homogeneous product; it consists of thousands of different species, grades, sizes and length specifications, all of which command different prices.

The Chicago-based lumber futures market, which has not eliminated severe market fluctuations as some had predicted, still exerts a psychological influence on price levels.

It is also interesting to note that lumber markets strengthened after President



Lumber ready for shipment to customers in Canada and abroad is produced at the Princeton, B.C., operation of Northwood Mills.

Nixon imposed price and profit restrictions on the U.S. industry last year. The restrictions induced American mills to switch production from items that come under the price freeze to other products where controls did not apply, or — as frequently occurred — mills stockpiled inventory and curtailed production because they had already reached their allowable profit for the year. Upward pressure on prices also accompanied forward sales by U.S. producers from their inventories to Japanese users.

As a consequence of price and profit controls, the U.S. lumber supply shrunk during a period of strong demand. American consumers were compelled to turn to Canadian suppliers for the balance of their needs. Canadian producers, unaffected by the controls, increased prices and U.S. consumers ended up paying more for their lumber than they would have had the controls not been imposed.

Demand Pressures By Japanese Users

In addition, record U.S. log and lumber exports to Japan in 1972 further reduced supplies in the American market and caused price increases in the U.S. and elsewhere. Recently, the Japanese government announced it has agreed to a voluntary 10 per cent reduction in imports of U.S. logs for the 12 months from July 1, 1973, from the preceding 12-month period. Noting the decision, The Japan Economic Journal commented that the government's decision to slash imports of U.S. logs is considered likely to "spur the shortage of lumber materials and further push up their prices." It is probable that Japanese users will seek increased supplies from Canadian producers.

The above factors are among the many influences that affect lumber prices and illustrate why it is impossible for any mill to have a serious impact on prices.

It is frequently asked why a lumber manufacturer cannot hold the line on prices. If a producer were to maintain unchanged quotations while other mills increased prices in response to higher demand, a wholesaler could simply exploit the situation by buying at the low price and re-selling at the prevailing market level. The end user would still pay the same price even though the producer had held the line. In such a situation, excessive profits would go to the wholesaler.

While some mills sell directly to retailers, the large number of accounts and their geographic diversity make the credit risks and servicing problems extremely great. As previously noted, wholesalers do provide a definite service. On the other hand, when a mill is unable to hold prices, its return from upward moves is moderate. Out of every increase of $1 per 1,000 FBM at recent price levels, 75 cents went to provincial and federal governments in the form of stumpage charges and taxes. (Stumpage represents payment to the provincial government for logs and is based on 3-month industry-wide sales, average selling price and harvesting costs. If one producer refrained from raising prices at the time other producers increased quotes in a rising market, he would still be faced with increased stumpage charges.)

High Tax Industry

Taxes paid by the Canadian forest industry are the highest in the world forest industry. Until mid-1971, a combination of depressed lumber prices and high taxes made the industry an unprofitable one. In fact, the northern interior region of British Columbia — where most of Northwood's production is obtained — was frequently referred to as the "graveyard of corporate profits."

A 1971 cost and profit study by Price Waterhouse and Company on the forest industry confirmed that companies accounting for more than one-half of the lumber produced in the northern interior region of British Columbia lost an aggregate of $2.3-million in 1966. In the 1963-66 period, logging and sawmilling costs of these companies increased by 22 per cent, while lumber prices rose by only 10 per cent.

Over a broader base period — 1951-73 — an increase of less than 55 per cent in lumber prices compares with a 375 per cent rise in land costs; 125 per cent increase in interest charges; a 300 per cent boost in construction wage rates, and an increase of 116 per cent in property taxes.

Viewed in the perspective of a 20-year period, it will be seen that lumber prices have not exerted a major impact on housing costs. Furthermore, lumber prices at the producer level recently declined from the record peaks reached in April, 1973, and there are indications that a less volatile demand and supply pattern will emerge by the end of 1973.

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Cover: One of the most striking buildings in New Madrid, Mo. – "The Home of Noranda Aluminum" – is this former private residence which was constructed in the early 1900s. Of colonial design, the structure now serves as the New Madrid County Health Centre. It contains six fireplaces – all surrounded by intricate carvings – and many stained glass windows and ceiling murals.